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EXAMINER

JONES, JUDSON

| ART UNIT | PAPER NUMBER |
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2834

DATE MAILED: 03/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/698,315

Applicant(s)

LAI ET AL.

Examiner

Judson H. Jones

Art Unit

2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1 and 4-22 is/are rejected.
- 7) ☒ Claim(s) 2 and 3 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 103103.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 21 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Page 14 lines 21-24, page 31 lines 7-10 and page 38 lines 3, 4 each describe means for combining the rotor frame and shaft together. Removing the fastening means would allow the rotor frame to possibly rotate on the shaft but that would not “separate the rotor frame and shaft from each other.” No other means that could separate the frame and shaft has been found in the specification.

Claim Objections

Claim 4 is objected to because of the following informalities: the phrase “each of the electromagnet units has a magnetic-pole surface each which is orientated in an axial direction” is unclear. The second “each which” seems to be missing the word “of.” Also the second each could refer to the magnetic-pole surface or to the electromagnet units. Changing the phrase to “each of the electromagnets units has a magnetic-pole surface with each surface being orientated in an axial direction” would be clearer. There are, of course, many other ways to make the sentence clearer. Appropriate correction is required.

Claim 5 is objected to because of the following informalities: the phrase “spaced apart at regular intervals, irregular intervals or regular and irregular intervals” appears to cover all possibilities. If the phrase does cover all possibilities, then it is not a limitation and it should not be in the claim. Appropriate correction is required.

Claim 13 is objected to because of the following informalities: the phrase “with adjacent poles having the same polarity, different polarity or the same polarity and different polarities” appears to cover all possibilities. Also the phrase “spaced apart at regular intervals, irregular intervals or regular and irregular intervals” appears to cover all possibilities. If the phrases cover all possibilities, then they are not limitations and they should not be in the claim. Appropriate correction is required.

Claim 14 is objected to because of the following informalities: the phrase “with adjacent poles having the same polarity, different polarity or the same polarity and different polarities” appears to cover all possibilities. If the phrase does cover all possibilities, then it is not a limitation and it should not be in the claim. Appropriate correction is required.

Claim Interpretation

According to Merriam Webster's Collegiate Dictionary Tenth Edition copyright 1997, stage means “one of a series of positions or stations, one above the other.” Applicant’s use of the term is shown by figures 11 and 13, with figure 11 having one stage and figure 13 having two stages. See Applicant’s specification page 27 lines 16-24 and page 26 lines 21-25. The word stage is interpreted to mean a series of positions, one above the other or one beside the other.

Claim Rejections - 35 USC § 103

Art Unit: 2834

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 4, 5, 7, 12, 13, 15 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese reference 2002-537749 (of record) in view of Jones 5,001,275 A. Japanese reference '749 discloses an axial air gap motor with electromagnet units 28, a rotor frame 36, 26a, 26b with permanent magnets 27, the centerline of the electromagnets intersecting the centerline of the permanent magnets and with sensor units as shown in figure 1 and as described in paragraphs 0016 and 0021-0023. Japanese reference '749 does not disclose using the electromagnets to repulse the permanent magnets. Jones teaches this idea in column 2 line 57 to column 3 line 21. Since Jones and Japanese reference '749 are from the same field of endeavor (both are DC powered brushless motors), it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized the pole repulsion

technique of Jones in an axial air gap motor in order to increase the available torque of the motor. See Jones column 3 lines 15-21.

In regard to claim 4, see elements 28 in Japanese reference '749 figure 1.

In regard to claim 5, see elements 28 in Japanese reference '749 figure 3.

In regard to claim 7, see element 32 in Japanese reference '749 figure 6.

In regard to claim 12, see elements 27 in Japanese reference '749 figure 1.

In regard to claims 13 and 15, see elements 27 in Japanese reference '749 figure 4.

In regard to claim 19, see shaft 24 and bearing 22 in Japanese reference '749 figure 1.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese reference '749 as modified by Jones as applied to claim 1 above, and further in view of Inaba et al. 3,784,850 A. Japanese reference '749 as modified by Jones discloses the axial gap motor but does not disclose electromagnet units arranged in one or more stages. Inaba et al. teaches electromagnet units arranged in stages as shown in figures 8 and 9 and as described in column 3 lines 3-41 for the purpose of increasing the driving torque and output power of the motor as described in column 3 lines 33-37. Since Inaba et al. and Japanese reference '749 as modified by Jones are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized electromagnet units arranged in stages in order to increase the driving torque and output power of the motor.

Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese reference '749 as modified by Jones as applied to claim 1 above, and further in view of Patarchi 6,486,582 B1. Japanese reference '749 as modified by Jones discloses the axial gap motor but does not disclose electromagnet units with C-shaped yokes with coils wound around the end

Art Unit: 2834

portions of the yokes. Patarchi discloses C-shaped yokes 21 as shown in figure 1 and as described in column 3 lines 58-64. Since Patarchi and Japanese reference '749 as modified by Jones are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized C-shaped yokes having an axial air gap motor in order to simplify the construction and reduce the cost of the machine. With C-shaped yokes, only the yoke pieces and the ring-shaped rotor need to be precisely made. In contrast, Japanese reference '749 has two rotating pieces, each having magnets 27, yokes 27a, 27b, rotating pieces 26a, 26b, spacer 36 and stator yoke 16, all of which require precision machining.

In regard to claims 9 and 10, see Patarchi figure 7.

In regard to claim 11, see Patarchi element 1 in figure 1.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese reference '749 as modified by Jones as applied to claim 1 above, and further in view of Inaba et al. 3,784,850 A. Japanese reference '749 as modified by Jones discloses the axial gap motor but does not disclose electromagnet units arranged in one or more stages. Inaba et al. teaches electromagnet units arranged in stages in column 3 lines 3-41 for the purpose of increasing the driving torque and output power of the motor as described in column 3 lines 33-37. Since Inaba et al. and Japanese reference '749 as modified by Jones are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized electromagnet units arranged in stages in order to increase the driving torque and output power of the motor. See Inaba figure 9 elements 46 and 47 for the magnets arranged in a circumferential direction.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese reference '749 as modified by Jones as applied to claim 1 above, and further in view of Skybyk 5,334,899 A. Japanese reference '749 as modified by Jones discloses the axial gap motor but does not disclose permanent magnet units made from multiple magnet pieces. Skybyk teaches making a permanent magnet unit from multiple magnet pieces in column 8 lines 17-26. Since Skybyk and Japanese reference '749 as modified by Jones are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized multiple magnet pieces to form a permanent magnet unit in order to reduce the cost of the permanent magnet unit.

Claims 17 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese reference '749 as modified by Jones as applied to claim 1 above, and further in view of Swett 6,633,106 B1. Japanese reference '749 as modified by Jones discloses the axial gap motor but does not disclose using titanium for a rotor frame. Swett teaches using titanium in column 12 lines 24 ½ to 27 ½. Since Swett and Japanese reference '749 as modified by Jones are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized titanium for the rotor frame in order to increase the strength of the rotor frame without increasing the weight of the frame, thereby making the motor more durable without reducing the efficiency of the motor.

In regard to claim 20, see Swett column 9 lines 39 to 46. Since Swett and Japanese reference '749 as modified by Jones are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized a flywheel with an axial air gap motor in order to allow the storing of power.

In regard to claim 21, see Swett column 12 lines 41-58. Since Swett and Japanese reference '749 as modified by Jones are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized a hub to connect the shaft to the rotor in order to hold the rotor frame securely to the shaft, thereby increasing the durability of the motor.

In regard to claim 22, see Swett column 22 lines 31 ½ to 43 ½. Since Swett and Japanese reference '749 as modified by Jones are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized a transmission in an axial air gap motor in order to increase the usefulness of the machine by allowing an increase or decrease in the output revolutions per minute with a proportionate increase or decrease in the output power.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese reference '749 as modified by Jones as applied to claim 1 above, and further in view of Tawse 4,211,945 A. Japanese reference '749 as modified by Jones discloses the axial gap motor but does not disclose multiple electromagnet units arranged on another rotor frame. Tawse teaches multiple rotor frames in figure 1 for the purpose of making it possible to construct units of greatly varying diameters, lengths and outputs as described in column 4 line 65 to column 5 line 4. Since Tawse and Japanese reference '749 as modified by Jones are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized multiple rotor frames to construct units of greater output and to thus increase the usefulness of the axial air gap motor.

Allowable Subject Matter

Claims 2 and 3 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record does not disclose or teach an axial air gap machine having poles using repulsion with a period where excitation current is not supplied as recited in claim 2. See Jones figure 4 where in the brush embodiment of the motor, there is a non-conductive space in between positive commutator segment 6a and negative commutator 6b. That space switches off the power as the permanent magnet units approach the electromagnets (time period 013), leaves the power from the time when the movable member magnets are equal to the stator magnets until the movable member moves past the stator magnets (time period 011) and turns the power on when the stator magnets and movable member magnets are in a position to repulse one another (time period 012). In the brushless version of the Jones device, see Jones figures 14-16. In figure 15 current is shown as being applied to one of each pair of power transistors. According to figure 15, either negative power or positive current is always applied to each electromagnet pole. Because Applicant's claim 1 recites a sensor unit used to control the power to the drive unit, only the brushless embodiment of Jones reads on Applicant's claims. The prior art of record does not disclose or teach a repulsion type axial air gap machine where a time period of pole attraction is combined with a time period of pole repulsion as recited in claim 3.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Judson H. Jones whose telephone number is 571-272-2025. The examiner can normally be reached on 8-4:30 M-F.

Art Unit: 2834

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on 571-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JHJ
JHJ 2/26/2004

Thanh Lam
THANH LAM
PRIMARY EXAMINER